MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

TAT 3131 – AGENT TECHNOLOGY

(All sections / Groups)

7 October 2016
9:00am – 11:00am

(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of **FIVE pages**, which includes the front cover, with **FOUR Questions** only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the answer booklet provided, and start each question on a new page.

Question 1 [10 marks]

(a) The field of multiagent systems is a disciplinary study, which includes logic, social sciences, game theory, economy, philosophy, ecology and etc. Many viewpoints have been drawn to comment on multiagent systems. For examples:
(i) Agents are just distributed/concurrent systems.
(ii) Agents are just game theories.
Clarify these two viewpoints.

[4 marks]

(b) Explain the difference between a reactive agent and a proactive agent.

[2 marks]

(c) Apart from flexibility (e.g., reactive, proactive and social abilities), what are another four desirable properties of an agent? Explain each of these four properties.

[4 marks]

Continued.....

Question 2 [10 marks]

(a) Explain the following terminologies.
   (i) Multiagent system
   (ii) Planning system
   (iii) Utility function

[3 marks]

(b) Two agents, namely agent i and agent j, are operating in an environment. Each agent has two possible actions Ac to choose, i.e., either C ("cooperate") or D ("defect"). Both agents simultaneously choose an action to perform, an outcome in Ω will result. The environment behavior is indicated by a *state transformer function* τ, where

$$\tau: Ac_i \times Ac_j \rightarrow \Omega$$

Ac_i is the action chosen by agent i, Ac_j is the action chosen by agent j, and $\Omega=\{w_1, w_2, w_3, w_4\}$.

   (i) What is the state transformation function that indicates neither agents have influence on the environment?
   (ii) What is state transformation function that indicates the environment is sensitive to actions of both agents?
   (iii) What is rational choice of agent i by referring to the following utility functions u? Explain why.

$$u_i(w_1) = 1 \quad u_i(w_2) = 1 \quad u_i(w_3) = 4 \quad u_i(w_4) = 4$$
$$u_j(w_1) = 1 \quad u_j(w_2) = 4 \quad u_j(w_3) = 1 \quad u_j(w_4) = 4$$

[3 marks]

(c) In the STRIPS planner, an action is described in four components: a *name*, a *pre-condition list*, a *delete list* and an *add list*. In the Blocks World problem, one of the operations is the *stack* action.

The *stack* action occurs when the robot arm places the object x it is holding is placed on top of object y.

Write the above *stack* action in the STRIPS language.

[4 marks]

Continued.....

Question 3 [10 marks]

(a) Compare the following auctions:

(i) Dutch auction

[2 marks]

(ii) Vikrey auction

[2 marks]

(b)

(i) What is the *Contract Net*?

[0.5 mark]

(ii) What are the three requirements for using the *Contract Net*?

[1.5 marks]

(c) What is the difference between theoretical reasoning and practical reasoning? Provide an example to explain each type of reasoning.

[4 marks]

Continued.....

Question 4 [10 marks]

(a) What is the difference between a symbolic reasoning agent and a reactive agent? Explain the differences between these two agents from the aspects of architecture and reasoning for decision making.

[6 marks]

(b) One of the two criteria for assessing a multiagent system is *coherence*. Explain this criterion. Identify a measurement for this criterion.

[2 marks]

(c) Searle (1969) identified various different types of speech act, which include *representative*, *directives*, *commisives*, *expressive*, and *declarations*. For each statement below, identify a type of speech act.

(i) I promise to wrap the gift.
(ii) Is the gift wrapped?
(iii) Please wrap the gift.
(iv) Thank you for wrapping the gift.

[2 marks]

End of Paper